

**B.Tech. MECHANICAL ENGINEERING  
(COMPUTER INTEGRATED  
MANUFACTURING) /**

**B.Tech. AEROSPACE ENGINEERING (BTAE) /  
BTMEVI**

**Term-End Examination  
December, 2018**

00803

**BME-018 : ENGINEERING MATERIALS**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note : Answer any five questions. Use of scientific calculator is allowed. Assume suitable data if any missing.*

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1. (a) A copper specimen of 64 mm gauge length and 12.8 mm diameter was tested in tension. Following two diameters were recorded in the plastic range of deformation :

$$\text{Load} = 25.75 \text{ kN}, d_1 = 12.176 \text{ mm}$$

$$\text{Load} = 24.25 \text{ kN}, d_2 = 8.581 \text{ mm}$$

Calculate strength coefficient and strain hardening exponent.

8

- (b) Mention the method of finding hardness. Describe any one method of finding hardness. 6
2. (a) Draw iron-carbon equilibrium phase diagram and mention all the temperatures and compositions of the relevant point clearly. Also point out various phase transformation reactions. 8
- (b) Briefly explain the concept of stress relieving and spheroidizing. 6
3. (a) Discuss properties of vitrified, resinoid and rubber bonding. 6
- (b) What are voids in grinding wheel? What role do they play in functioning of the grinding wheel? 8
4. (a) A unidirectional FRP is produced with fibre volume ratio of 60%, the density of fibre is 1480 kg/m<sup>3</sup>. Determine the weight percentages of matrix and fibre and the density of the composite. Also determine the modulus of elasticity of the composite. 8
- Take  $E_s = 70 \text{ MPa}$ ,  $E_m = 3 \text{ GPa}$ .
- (b) Explain three basic structures of a polymer. Which structure is preferred for mechanical strength and why? 6

5. (a) An edge cracked beam carries crack in its central plane whose length is 5 mm. A load of 1000 N is applied opposite to crack so that crack would tend to open in bending. Calculate SIF of crack if the beam has the following dimensions : 8  
 $W = 25 \text{ mm}, B = 10 \text{ mm}, S = 100 \text{ mm}.$
- (b) With the help of sketches, briefly explain fatigue crack growth in a ductile material. 6
6. (a) Define the term wear. What are the factors that influence wear ? 7
- (b) Describe different types of lubricants. 7
7. (a) Explain the following terms : 8  
 (i) Carburizing  
 (ii) Cyaniding  
 (iii) Nitriding  
 (iv) Chromizing
- (b) Differentiate between isostrain and isostress loading of a composite. State the condition of stress and strain in both the cases. 6
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